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(54)【発明の名称】 節度付エンコーダ

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(57)【特許請求の範囲】

【請求項1】刷子台に外部より操作可能な操作軸を取付け、この操作軸の操作側とは反対の端面部に、回転中心より円形接点と円環状に配設された第1および第2のパルス信号用櫛歯接点と節度溝部とが回転中心に対して放射状に一体の導電性材料で形成された接点板を取付け、前記操作軸の回転により前記第1および第2のパルス信号用櫛歯接点上を摺接する第1および第2の電気的刷子と前記円形接点上を摺接する第3の電気的刷子とを刷子台に設けるとともに、前記節度溝部に係合して節度を付ける節度用クリツクばねを刷子台に設け、前記第1と第2および第3の電気的刷子はそれぞれ独立して設けられ、前記節度用クリツクばねが前記節度溝部にはまり込んだ状態で前記第1および第2の電気的刷子間が絶縁されストラップ構成した節度付エンコーダ

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【請求項2】第1および第2のパルス信号用櫛歯接点と円形接点と節度溝部とを一体に形成した導電性材料を、操作軸に固定した特許請求の範囲第1項記載の節度付エンコーダ。

【発明の詳細な説明】

産業上の利用分野

本発明は、ビデオ、電子レンジなどの電子機器のデータ入力装置として用いられる回転式節度付エンコーダの改良に関するものである。

従来の技術

従来の回転式節度付エンコーダは、第4図に示すように、操作軸1に取付けられた回転絶縁板2にばね性を有する互いに導通した3本の金属性摺動子3～5がかしめられて、対向する位置に固定された絶縁基板6の上に印

線性成形材料と一体成形で形成された第5図に示すような歯状円環接点板7,8および環状集電板9に接するように構成され、この金属性摺動子3,4が歯状円環接点板7,8の各凸部7a,8aに接触したときにパルス信号を発生する。また、絶縁基板6とは反対側で回転絶縁板2と対向する位置に節度板10が絶縁基板6に取付けられたカバー11に連結して設けられ、この節度板10の回転絶縁板2に対向する面には、歯状円環接点板7,8の凸部7a,8aの数に対応するだけの数の溝部10aが周方向に刻設され、操作軸1に取付けられたばね性を有するクリックばね12の係止突部12aが節度板10の溝部10aに係合したときに操作軸1の節度が得られる。

第5図において、 $T_1$ ～ $T_3$ は端子であり、端子 $T_1$ ,  $T_3$ はそれぞれ櫛歯状円環接点板8, 7に電気的に接続され、端子 $T_2$ は環状集電板9に電気的に接続されている。ここで、環状集電板9と端子 $T_2$ との接続部および櫛歯状円環接点板8と端子 $T_1$ との接続部には、第5図のハッチングで示すように絶縁被覆部13a, 13bが設けられている。

発明が解決しようとする問題点

上記構成において、第5図に示すように、2重に印刷された歯車状円環接点板7,8の外環の凸部7aと内環の凸部8aの円環中心からの角度に一定方向のズレが設けられており、アップカウントとダウンカウントの判別は第6図に示すように、端子T<sub>1</sub>～T<sub>2</sub>間の回路Iと端子T<sub>2</sub>～T<sub>3</sub>間の回路IIの位相差を、エンコーダが装着されるセット内部の回路により検知することにより行っている。しかし、操作軸1を操作していない状態においては、クリックばね12の係止突部12aは節度板10の溝部10aにはまり込んだ状態になっているが、この状態で振動などにより回路IまたはIIがON状態になると誤動作してアップカウントまたはダウンカウントするため、必ず回路I,IIは振動などに対しても確実にOFF状態でなければならない。

従来の節度付エンコーダでは、信号発生部と節度部が一体構成となっておらず、信号と節度のタイミングにばらつきを発生しやすく、操作軸1が節度点にあるときににおいて、信号が必ずOFFであるようにするために、部品精度の向上が必要であり、コスト合理化できないという問題点があった。

本発明は上記従来の問題点を解決するものであり、精度の優れた廉価な節度付コンコーダを提供することを目的とするものである。

### 問題点を解決するための手段

上記問題点を解決するために、本発明は、刷子台に外部より操作可能な操作軸を取り付け、この操作軸の操作側とは反対の端面部に、回転中心より円形接点と円環状に配設された第1および第2のパルス信号用歫歛接点と節度溝部とが回転中心に対して放射状に一体の導電性材料で形成された接点板を取り付け、前記操作軸の回転により前記第1および第2のパルス信号用歫歛接点上を摺接する第1および第2の電気的刷子と前記円形接点上を摺接する

する第3の電気的刷子とを刷子台に設けるとともに、前記節度溝部に係合して節度を付ける節度用クリツクばねを刷子台に設け、前記第1と第2および第3の電気的刷子はそれぞれ独立して設けられ、前記節度用クリツクばねが前記節度溝部にはまり込んだ状態で前記第1および第2の電気的刷子間が絶縁されるように構成したものである。

## 作用

上記構成により、第1および第2のパルス信号用歯接点と節度溝部を一体の接点板で構成したので、両者を同時に加工形成することができ、節度用クリツクばねが節度溝部にはまり込んだ状態で、第1および第2の電気的刷子間の絶縁された状態は確実に維持されることになり、節度付エンコーダの要求特性を容易に満足するだけでなく、従来必要としていた電気的接点板と節度用クリツク板の2部品を、操作軸先端に取付けた接点板の1部品で構成でき、コストを低減できる。また、節度溝部は接点板の回転中心に対して放射状に形成されているため、節度溝部の加工形成が容易である。

寒施例

以下本発明の一実施例を図面に基づいて説明する。

第1図は本発明の一実施例の要部を示す操作軸部分の斜視図である。第1図において、外部より操作可能な操作軸21の操作側とは反対の端面に接点板22がインサート成形にて固定されている。この接点板22には、回転中心より円形接点22aと、その外側に第1のパルス信号用櫛歯接点22b（導電部）と22e（絶縁部）と、その外側に第2のパルス信号用櫛歯接点22c（導電部）と22f（絶縁部）と、さらに外周縁に節度溝部22dが回転中心に対して放射状に形成されている。この第1および第2のパルス信号用櫛歯接点22b, 22cの円周方向はほぼ同一平面であり、節度溝部22dの円周方向は凹凸の繰り返しで構成されている。

第2図は本発明の一実施例の全体構造を示す断面図である。第2図において、操作軸21はこれを保持する軸受23にかしめられたカバー24を介して刷子台25に取付けられている。この刷子台25には、操作軸21を回転させたときに、第1および第2のパルス信号用歯接点22b, 22cに摺接する第1および第2の電気的刷子27, 28と、円形接点22aに摺接する第3の電気的刷子26とが設けられ、また、節度溝部22dに係合する係止突部29aを有する節度用クリックばね29が設けられており、さらに、第3図に示すように、第1および第2の電気的刷子27, 28は端子T<sub>1</sub>, T<sub>3</sub>に、第3の電気的刷子26は端子T<sub>2</sub>にそれぞれ接続されている。30は操作軸21の先端の位置決けをする取付金具である。

操作軸21の回転により、第1および第2の電気的刷子27, 28は第1および第2のパルス信号用櫛歯接点22b, 22cと導通、非導通を繰り返しながら、また第3の電気的刷子26は凹形接点22aと導通を保ちながら切换し、第3回路

クリックばね29の係止突部29aが節度溝部22dに係合した状態において、電気的刷子27, 28は互いに電気的絶縁状態にならるよう構成されている。また、操作軸21が右回転のときは、第6図に示すように、第1のパルス信号用歯歯接点22bを含む回路Iにより発生するパルス信号は、第2のパルス信号用歯歯接点22cを含む回路IIにより発生するパルス信号より位相が進むように設定され、左回転のときは、回路IIで発生するパルス信号の方が回路Iで発生するパルス信号より位相が進むように設定されている。

このように、節度用クリックばね29の係止突部29aが節度溝部22dにはまり込んだ状態の操作軸安定位置において、端子T<sub>1</sub>, T<sub>3</sub>が互いに電気的に絶縁状態であることが、節度付エンコーダの要求特性のうち重要な項目であるが、上記実施例によれば、項目を充分満足できる。

#### 発明の効果

以上本発明によれば、パルス信号用歯歯接点と節度溝部が一体の接点板で構成されていることにより、両者を同時に加工形成することができ、部品誤差および組合せ誤差を低減でき、両者の位置関係精度は向上し、節度

付エンコーダの要求特性を容易に満足するだけでなく、従来のように電気的接点板と節度用クリック板の2部品を必要とせず、接点板の1部品で構成できるため、コスト合理化の効果も大きい。また、節度溝部は接点板の回転中心に対して放射状に形成されているため、節度溝部の加工形成が容易である。

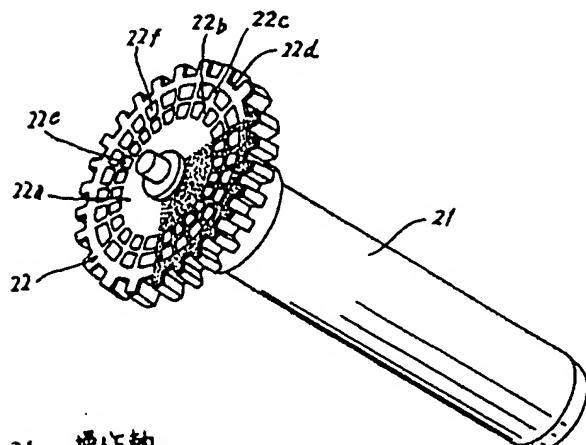
#### 【図面の簡単な説明】

第1図は本発明の一実施例の要部を示す操作軸部分の斜視図、第2図は本発明の一実施例の節度付エンコーダの全体構成を示す断面図、第3図(a) (b)は同節度付エンコーダの刷子台の平面図および部分断面図、第4図は従来の節度付エンコーダの断面図、第5図は同従来の節度付エンコーダの接点板平面図、第6図は節度付エンコーダの出力信号波形図である。

21…操作軸、22…接点板、22a…円形接点、22b, 22c…第1および第2のパルス信号用歯歯接点、22d…節度溝部、24…カバー、25…刷子台、26…第3の電気的刷子、27, 28…第1および第2の電気的刷子、29…節度用クリックばね。

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【第1図】



21…操作軸

22…接点板

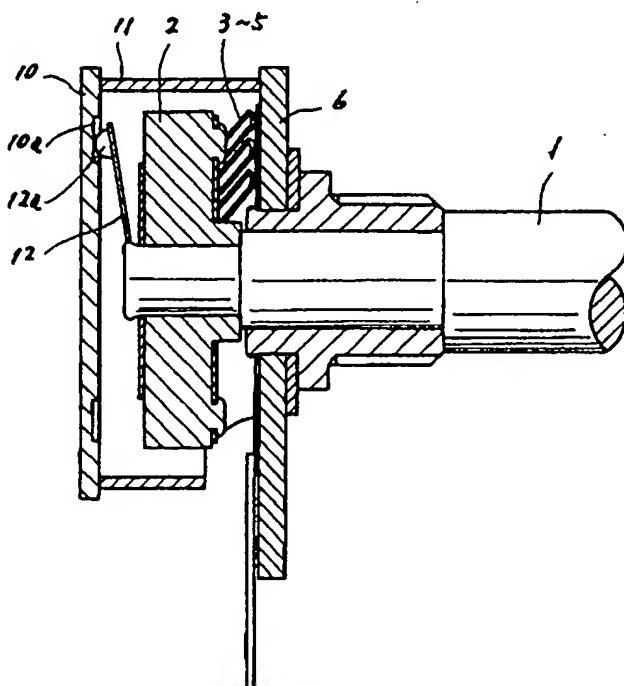
22a…円形接点

22b, 22c…第1および第2のパルス信号用歯歯接点

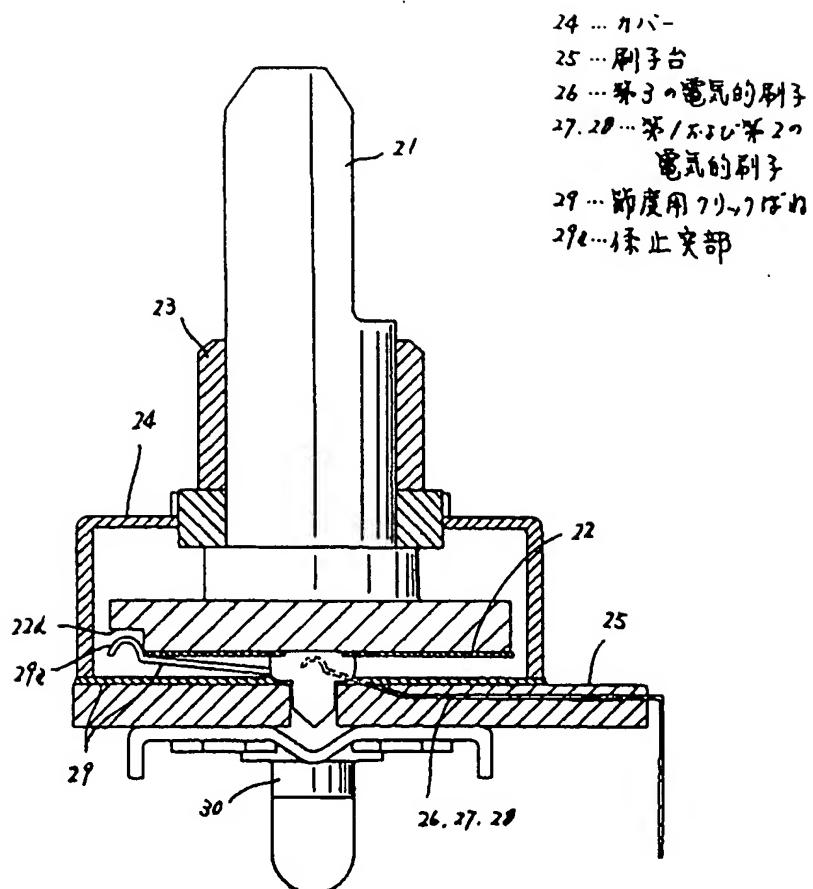
22d…節度溝部

22e, 22f…絶縁部

【第4図】



【第2図】

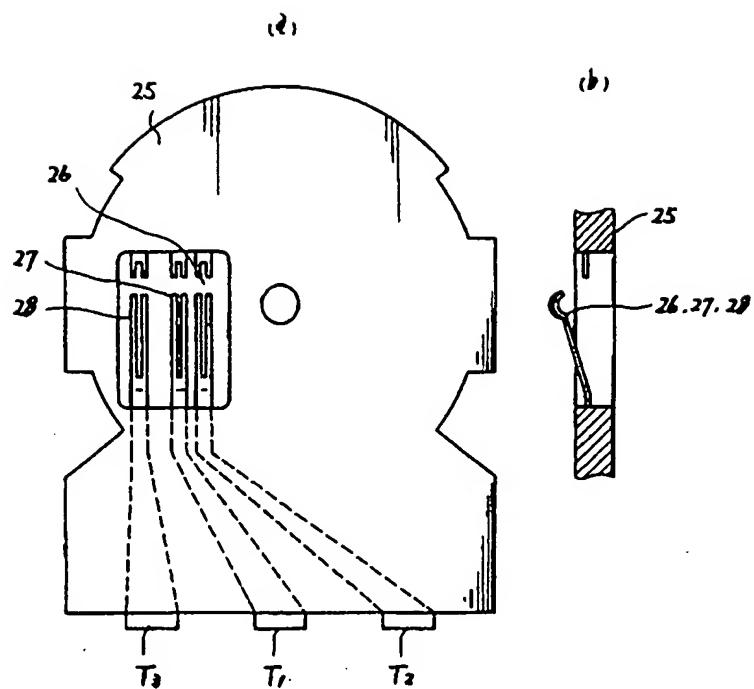


【第6図】

エンコーダの出力信号図

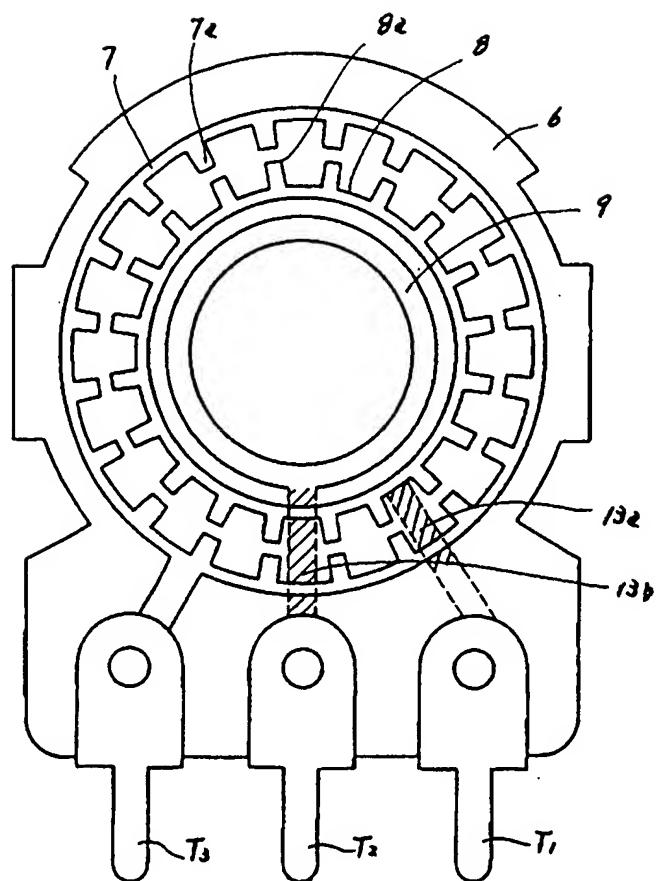
操作軸 回路	右回転	左回転
回路1 ( $T_1 \sim T_2$ 間)	ON ズレ OFF	ON OFF
回路2 ( $T_2 \sim T_3$ 間)	ON OFF	ON ズレ OFF

【第3図】



25 ... 刷子台  
 26 ... 第3の電氣的刷子  
 27, 28 ... 第1及び第2の電氣的刷子  
 T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> ... 端子

【第5図】



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CLAIMS

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(57) [Claim(s)]

[Claim 1] An operation shaft more operational than the exterior is attached in a brush base. in the end-face section opposite to a this operation shaft operation-side The contact board with which the 1st arranged a circular contact and in the shape of an annulus ring and 2nd ctenidium contacts for pulse signals and moderation slots were formed in the radial from the center of rotation with a conductive material of one to the center of rotation is attached. While preparing the 3rd electric brush which \*\*\*\*s the aforementioned circular contact top to the 1st and 2nd electric brushes which \*\*\*\*s the above 1st and 2nd ctenidium contact top for pulse signals by rotation of the aforementioned operation shaft in a brush base The click spring for moderation which engages with the aforementioned moderation slot and attaches moderation is prepared in a brush base. The above 1st, the 2nd, and 3rd electric brushes are the encoders with moderation constituted so that between the above 1st and the 2nd electric brush might be insulated, after it is prepared independently, respectively and the aforementioned click spring for moderation has got into the aforementioned moderation slot.

[Claim 2] The encoder with moderation given in the 1st term of a patent claim which fixed to the operation shaft a conductive material which formed the 1st and 2nd ctenidium contacts for pulse signals, circular contacts, and moderation slots in one.

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[Translation done.]

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

Field of the Invention this invention relates to improvement of the encoder with rotating type moderation used as a data entry unit of electronic equipment, such as video and a microwave oven.

Prior art The conventional encoder with rotating type moderation As shown in a view 4, three metallicity sliding children 3-5 who have spring nature and who flowed mutually are rebuked to the rotation electric insulating plate 2 attached in the operation shaft 1. [ whether it is formed of printing or etching on the insulating substrate 6 fixed to the position which counters, and ] Or it is constituted so that it may \*\*\*\* to the ctenidium-like annulus ring contact boards 7 and 8 and the annular collecting electrode plate 9 as shown in the view 5 an insulating molding material and really formed by fabrication, and a pulse signal is generated when these metallicity sliding children 3 and 4 contact each heights 7a and 8a of the ctenidium-like annulus ring contact boards 7 and 8. Moreover, the moderation board 10 is connected and formed in the rotation electric insulating plate 2 and the position which counters by the opposite side in an insulating substrate 6 at the covering 11 attached in the insulating substrate 6. In the field which counters the rotation electric insulating plate 2 of this moderation board 10 Slot 10a of only the number corresponding to the number of the heights 7a and 8a of the ctenidium-like annulus ring contact boards 7 and 8 is engraved on a hoop direction, and when stop projected part 12a of the click spring 12 which has the spring nature attached in the operation shaft 1 engages with slot 10a of the moderation board 10, the moderation of the operation shaft 1 is acquired.

In the view 5, T1-T3 are terminals, terminals T1 and T3 are electrically connected to the ctenidium-like annulus ring contact boards 8 and 7, respectively, and the terminal T2 is electrically connected to the annular collecting electrode plate 9. Here, as hatching of a view 5 shows, the pre-insulation sections 13a and 13b are formed in the connection of the annular collecting electrode plate 9 and a terminal T2, and the connection of the ctenidium-like annulus ring contact board 8 and a terminal T1.

Trouble which invention tends to solve In the above-mentioned composition, as shown in a view 5 As gap of the fixed direction is prepared in the angle outside the ctenidium-like annulus ring contact boards 7 and 8 printed doubly from the annulus ring center of heights 7a of a ring, and heights 8a of an inner ring and distinction of a rise count and a down count is shown in a view 6 It is carrying out by detecting the phase contrast of the circuit I between a terminal T1 - T2, and the circuit II between a terminal T2 - T3 by the circuit inside the set with which an encoder is equipped. However, in the state where the operation shaft 1 is not operated, if Circuits I or II will be in ON state by vibration etc. in this state, it malfunctions, and although stop projected part 12a of the click spring 12 will be fitted into slot 10a of the moderation board 10, in order to rise-count or down count, Circuits I and II must be in an OFF state certainly also to vibration etc.

In the conventional encoder with moderation, when a signal generator and the moderation section did not really become composition, but it was easy to generate dispersion to the timing of a signal and moderation and the operation shaft 1 was in a moderation point, there was a trouble that improvement in part precision was required for a sake, and cost rationalization could not be carried out making it a signal be surely OFF.

this invention solves the above-mentioned conventional trouble, and it aims at offering the cheap contest coder with moderation which was excellent in precision.

Means for solving a trouble In order to solve the above-mentioned trouble, this invention An operation shaft more operational than the exterior is attached in a brush base. in the end-face section opposite to a this operation shaft operation-side The contact board with which the 1st arranged a circular contact and in the shape of an annulus ring and 2nd ctenidium contacts for pulse signals and moderation slots were formed in the radial from the center of rotation with a conductive material of one to the center of rotation is attached. While preparing the 3rd electric brush which \*\*\*\*s the aforementioned circular contact top to the 1st and 2nd electric brushes which \*\*\*\* the above 1st and 2nd ctenidium contact top for pulse signals by rotation of the aforementioned operation shaft in a brush base The click spring for moderation which engages with the aforementioned moderation slot and attaches moderation is prepared in a brush base. The above 1st, the 2nd, and 3rd electric brushes are prepared independently, respectively, and they are constituted so that between the above 1st and the 2nd electric brush may be insulated, after the aforementioned click spring for moderation has got into the aforementioned moderation slot.

Operation By the above-mentioned composition, since the 1st and 2nd ctenidium contacts for pulse signals and moderation slots were constituted from a contact board of one After it can carry out processing formation of both simultaneously and the click spring for moderation has got into a moderation slot The state where it insulated between the 1st and 2nd electric brushes will be maintained certainly. It can constitute from one part of the contact board which attached two parts of an electric contact board and the click board for moderation needed conventionally at the nose of cam of an operation shaft, and it not only satisfies the demand property of an encoder with moderation easily, but can reduce cost. Moreover, since the moderation slot is formed in the radial to the center of rotation of a contact board, processing formation of a moderation slot is easy for it.

Example One example of this invention is explained based on a drawing below.

A view 1 is a perspective diagram for an operation shank showing the important section of one example of this invention. In the view 1, the contact board 22 is being fixed to the end-face section opposite to an operation shaft 21 more operational than the exterior operation-side in insert molding. this contact board 22 -- the center of rotation -- they are further formed in circular contact 22a and its outside for 22d of moderation slots to the center of rotation at the radial to the 1st ctenidium contacts 22b (current carrying part) and 22e (insulating section) for pulse signals and

outside on the periphery edge with the 2nd ctenidium contact 22c (current carrying part) and 22f (insulating section) for pulse signals. The circumferential direction of these the 1st and 2nd ctenidium contacts 22b and 22c for pulse signals is the same flat surface mostly, and the circumferential direction of 22d of moderation slots consists of concavo-convex repeats.

A view 2 is a cross section showing the whole one example structure of this invention. In the view 2, the operation shaft 21 is attached in the brush base 25 through the covering 24 closed to the bearing 23 holding this. The 1st and 2nd electric brushes 27 and 28 which \*\*\*\* at the 1st and 2nd ctenidium contacts 22b and 22c for pulse signals when this brush base 25 is made to rotate the operation shaft 21. As the click spring 29 for moderation which has stop projected part 29a which the 3rd electric brush 26 which \*\*\*\*s to circular contact 22a is formed, and engages with 22d of moderation slots is formed and it is further shown in a view 3. The 1st and 2nd electric brushes 27 and 28 are connected to terminals T1 and T3, and the 3rd electric brush 26 is connected to the terminal T2, respectively. 30 is a fixing metal which carries out \*\*\*\*\* at the nose of cam of the operation shaft 21.

By rotation of the operation shaft 21, the 1st and 2nd electric brushes 27 and 28, repeating the 1st and the 2nd ctenidium contact 22b and 22c for pulse signals and a flow, and un-flowing. Moreover, the 3rd electric brush 26 \*\*\*\*s maintaining circular contact 22a and a flow, and in the state where stop projected part 29a of the click spring 29 for moderation engaged with 22d of moderation slots, the electric brushes 27 and 28 are constituted so that it may be in an electric insulation state mutually. Moreover, the pulse signal generated by the circuit I containing 1st ctenidium contact 22b for pulse signals as shown in a view 6 when the operation shaft 21 is a RRC is set up so that a phase may progress from the pulse signal generated by the circuit II containing 2nd ctenidium contact 22c for pulse signals, and at the time of a RLC, it is set up so that a phase may progress from the pulse signal which the direction of the pulse signal generated in Circuit II generates in Circuit I.

Thus, in the operation shaft stable position in the state where stop projected part 29a of the click spring 29 for moderation got into 22d of moderation slots, although it is an important item among the demand characteristics of an encoder with moderation that terminals T1 and T3 are in an insulating state electrically mutually, according to the above-mentioned example, an item can be satisfied enough.

**Effect of the invention** According to this invention, above by the ctenidium contact for pulse signals and the moderation slot consisting of contact boards of one Processing formation of both can be carried out simultaneously, and a part error and a combination error can be reduced. Since both physical relationship precision improves, and it not only satisfies the demand characteristics of an encoder with moderation easily, but it does not need two parts of an electric contact board and the click board for moderation like before but can constitute them from one part of a contact board, its effect of cost rationalization is also large. Moreover, since the moderation slot is formed in the radial to the center of rotation of a contact board, processing formation of a moderation slot is easy for it.

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[Translation done.]

\* NOTICES \*

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- 2.\*\*\*\* shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

The perspective diagram for an operation shank showing [ 1 ] the important section of one example of this invention, the cross section showing [ 2 ] the whole encoder composition with moderation of one example of this invention, A view 3 (a) and (b) are [ the contact board plan of the encoder with moderation of \*\*\*\*\* and the view 6 of the plan of the brush base of an encoder with the said moderation and a fragmentary sectional view, the cross section of the encoder with moderation of the former / view / 4 ], and a view 5 / output signal wave form charts of an encoder with moderation.

21 [ .. A circular contact, 22b, 22c / .. The 1st and the 2nd ctenidium contact for pulse signals, 22d / .. A moderation slot, 24 / .. Covering, 25 / .. A brush base, 26 / .. 27 The 3rd electric brush, 28 / .. The 1st and 2nd electric brushes 29 / .. Click spring for moderation. ] .... An operation shaft, 22 .. A contact board, 22a

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[Translation done.]

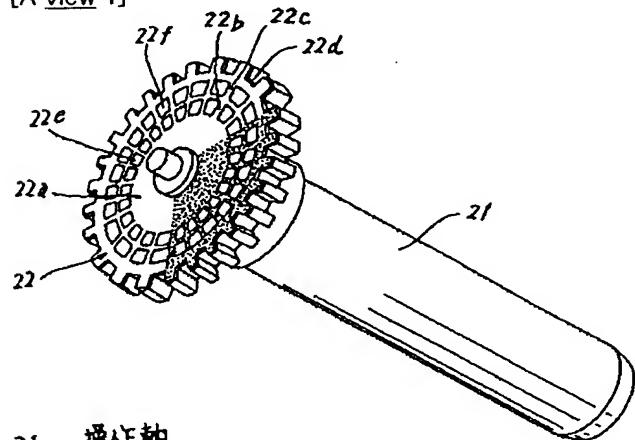
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2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

DRAWINGS

[A view 1]



21 ... 操作軸

22 ... 接点板

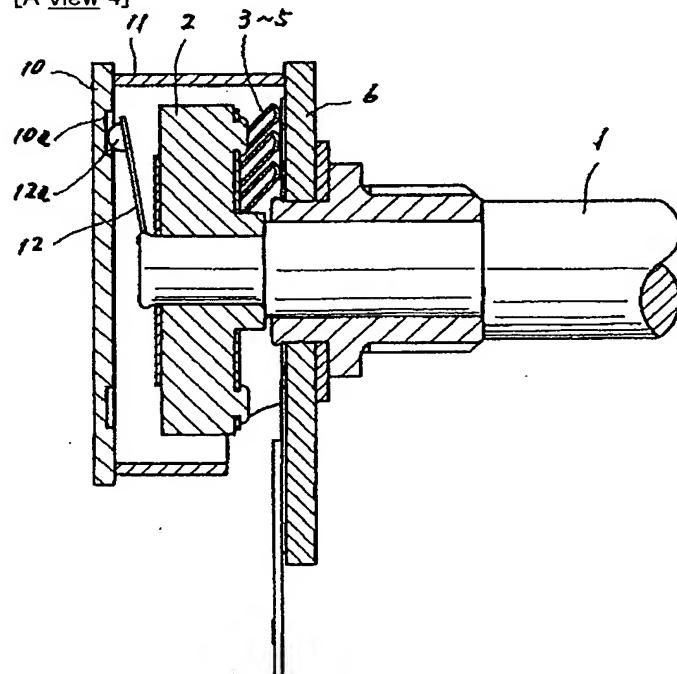
22a ... 円形接点

22b, 22c ... 第1バルス第2バルス信号用歯

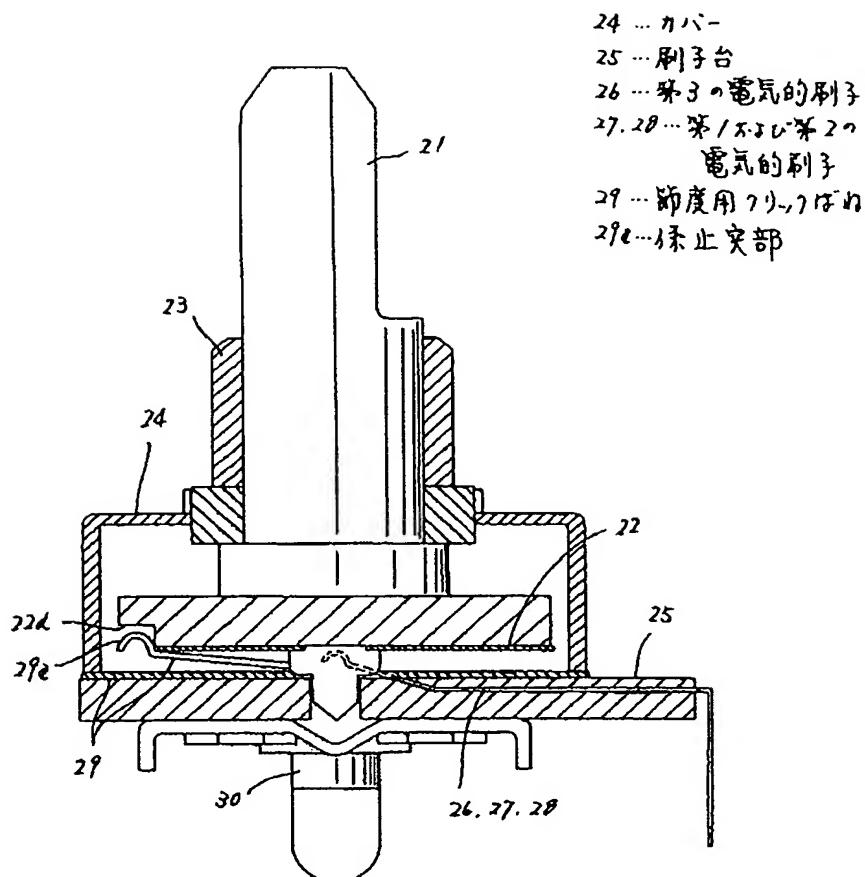
22d ... 節度溝部

22e, 22f ... 絶縁部

[A view 4]



[A view 2]



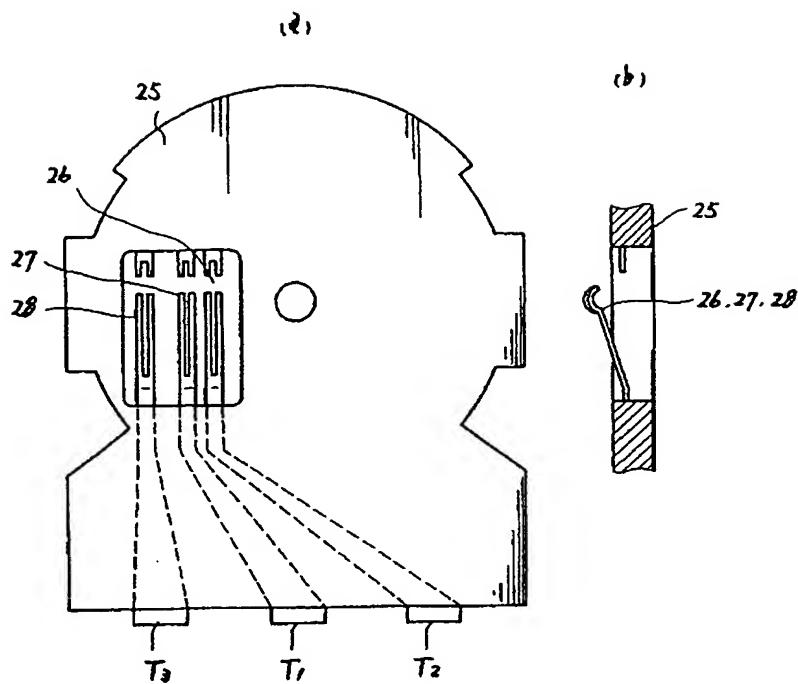
- 24 ... カバー
- 25 ... 刷子台
- 26 ... 第3の電気的刷子
- 27, 28 ... 第1および第2の電気的刷子
- 29 ... 鋼度用ワリタばね
- 29e ... 継止実部

[A view 6]

### エンコーダの出力信号図

操作軸 回路	右回転	左回転
回路1 ( $T_1 \sim T_2$ 間)	ON → OFF ← ズレ →	ON → OFF ←
回路2 ( $T_2 \sim T_3$ 間)	ON → OFF ←	ON → OFF ← ズレ →

[A view 3]



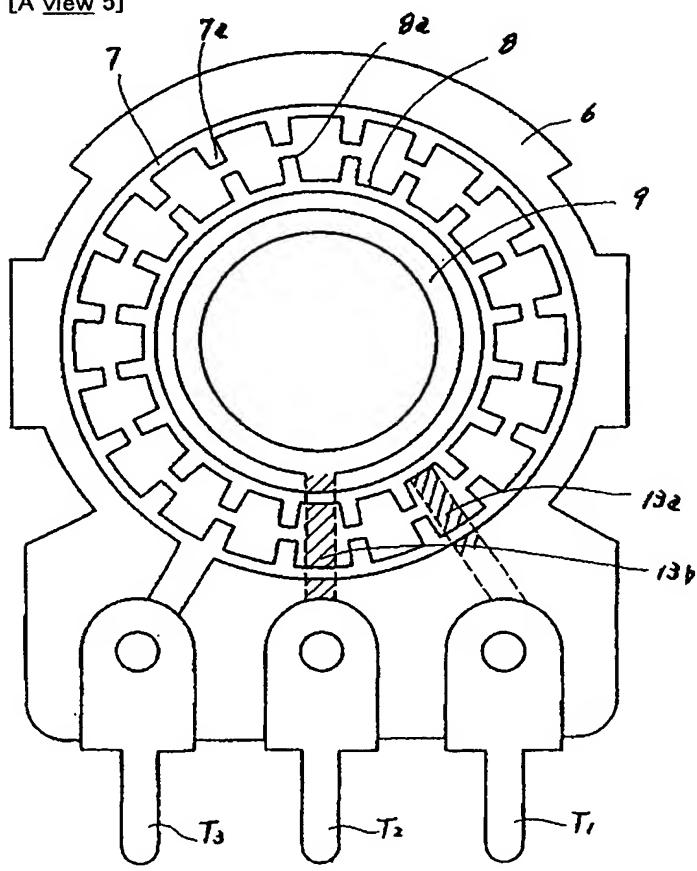
25 ... 刷子台

26 ... 第3の電氣的刷子

27, 28 ... 第1及第2の電氣的刷子

T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> ... 端子

[A view 5]



[Translation done.]